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EXAMINER

CAO, PHAT X

ART UNIT PAPER NUMBER

2814

DATE MAILED: 08/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/657,119

Applicant(s)

AKIYAMA, KAZUTAKA

Examiner

Phat X. Cao

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-12 is/are rejected.
- 7) ☒ Claim(s) 5, 13 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/21/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US. 6,906,374) in view of Matsuoka et al (US. 6,809,364).

Regarding claims 1-2, Tanaka (Fig. 34) discloses a semiconductor device comprising: a semiconductor substrate 4; a first wiring 40 formed above the semiconductor substrate 4 with a first insulating film 36/32 interposed therebetween; an MIM capacitor having a lower metal electrode 54 or 11 (Fig. 1) (column 6, lines 15-16) and an upper metal electrode 58 (column 13, lines 47-50), and formed above the first insulating film 36/32; a second insulating film 48 formed to cover the sides of the upper metal electrode 58 of the MIM capacitor; and a guard ring 54 (see the rightmost 54 and column 11, lines 35-38) buried in the second insulating film 48 surrounding the MIM capacitor, wherein the guard ring 54 (rightmost 54) is provided such that the guard ring 54 is electrically insulated from the wirings and the MIM capacitor.

Tanaka does not disclose a second wiring formed on the second insulating film 48.

However, Matsuoka (Fig. 22) teaches a semiconductor device comprising: a first wiring 21 formed above a first insulating film 902/903; a capacitor 23 having an upper electrode 24 is covered by a second insulating film 905/906; and a second wiring 26 formed on the second insulating film 905/906 and connected to the first wiring 21 via a hole 25 formed in the second insulating film. Accordingly, it would have been obvious to form a second wiring on the second insulating film of Tanaka because as taught by Matsuoka, such forming of the second wiring would provide an additional wiring layer desired for the semiconductor device (column 8, lines 52-56).

Regarding claim 3, Tanaka (Fig. 34) further discloses the guard ring 54 formed of tungsten, which is the same material as the lower capacitor electrode (column 6, lines 15-23) and same material as the first wiring 40 (column 11, lines 16-18). Therefore, it would have been obvious to form the second wiring with tungsten which is the same material as the first wiring 40 and the guard ring 54 because tungsten is a well known conductor and commonly used for wiring because of its high conductivity characteristics.

Regarding claim 4, Tanaka (Fig. 34) further discloses the metal ring 54 is in an electrically floating state (no connection).

Regarding claim 10, because the MIM capacitor is completely surrounded by the guard ring 54, the guard ring 54 would inherently cut a seam generated in the second insulating film around the MIM capacitor.

Regarding claim 11, Tanaka further discloses that a width of the guard ring 54 or a dimension of the tubular metal ring 54 is in the range of 0.1 to 1 μm (column 9, lines 14-16).

Regarding claim 12, Tanaka's Fig. 34 further discloses a block insulating film 42 formed between the first and second insulating film to cover the first wiring 40.

2. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka and Matsuoka as applied to claim 1 above, and further in view of Nguyen et al (US. 2004/0092095).

Neither Tanaka nor Matsuoka disclose the second insulating film made of material having dielectric constant as claimed.

However, Nguyen (Fig. 1E) teaches the forming of an insulating film 104 surrounding an interconnect and made of materials including fluorine containing silicon oxide (FSG), carbon containing silicon oxide (SiOC), or porous silicon oxide (par. [0023]). Accordingly, it would have been obvious to form the second insulating film of Tanaka with the materials as set forth above because these dielectric materials having a very low dielectric constant, such as less than about 3, as taught by Nguyen (par. [0023]).

Allowable Subject Matter

3. Claims 5 and 13-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

See reasons of record.

Response to Arguments

4. a) Applicant argues that Tanaka (Fig. 34) does not suggest “a second insulating film formed to cover an upper electrode of said MIM capacitor” .

It appears that Applicant argues that the second insulating film 48 does not cover the upper electrode 58 because it does not cover the top surface of the upper electrode 58. However, the limitation of having the second insulating film covering the top surface of the upper electrode does not seem to be required by the claim language. Therefore, Tanaka does suggest “a second insulating film formed to cover an upper electrode of said MIM capacitor” because the second insulating film 48 is clearly formed surround the upper electrode 58 and the lower electrode 54 to cover the sides of the upper electrode 58 and the lower electrode 54 of the capacitor. Furthermore, Matsuoka (Fig. 22) also teaches the obviousness of forming a second insulating film 905/906 completely cover the capacitor structure 23, including the top and sides surfaces of the upper electrode 24 for the purpose of providing an additional wiring layer desired for the semiconductor device.

b) Regarding the combination of Tanaka and Matsuoka, Applicant argues that “The Examiner merely provided descriptions of how the references allegedly teach certain features without providing “clear and particular reasons” for the combination.

The examiner disagrees because the motivation as suggested by Matsuoka to modify the device of Tanaka is “clear and particular” to one skilled in the art. Specifically, the examiner states “it would have been obvious to form a second wiring on the second insulating film of Tanaka because as taught by Matsuoka, such forming of

the second wiring layer would provide an additional wiring layer desired for the semiconductor device (column 8, lines 52-56). The examiner recognizes that one skilled in the art would have no difficulty to understand the motivation provided by Matsuoka for combining the references as suggested.

c) Applicant (page 6) further argues that it is impossible to modify the device of Tanaka by forming an additional wiring lines (suggested by Matsuoka) in the peripheral circuit region.

It is noted that the arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F. 2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F. 3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997). Attorney statements which are not evidence and which must be supported by an appropriate affidavit or declaration. Therefore, in view of teachings of Matsuoka, if Applicant believes that it is impossible to form an additional wiring lines in the peripheral circuit region of Tanaka's device, then Applicant is requested to support that position with facts.

d) Applicant (page 8) also argues that it would not be obvious to combine Nguyen with Tanaka and Matsuoka because Nguyen does not teach the "guard ring".

This argument has no immediate apparent relevance to the issues presented by the rejection because Applicant cannot show nonobviousness by attacking references individually where the rejection is based upon a combination of references. In re Young, 403 F. 2d 754, 757, 159 USPQ 725, 728 (CCPA 1968). The examiner relies on the combined teachings of Nguyen with Tanaka and Matsuoka. Nguyen is not relied on for teaching a "guard ring". Tanaka discloses a "guard ring". Nguyen is relied on for

showing the it was known to form an insulating film surrounding an interconnect and made of materials including fluorine containing silicon oxide, carbon containing silicon oxide, or porous silicon oxide (par. [0023]). The examiner thus regards Applicant's assertions as constituting evidence that Applicant has failed to consider as a whole the prior art teachings disclosed by the combining of the references.

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

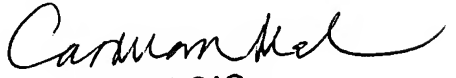
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is 571-272-1703. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PC
August 4, 2006


PHAT X. CAO
PRIMARY EXAMINER